

EXHIBIT 12



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Report of Kimberly K. Cameron, Ph.D., P.E.

Prepared for: Class Counsel, Grey Fox, LLC, et al. v. Plains All American Pipeline, L.P., et al.,
No. 2:16-cv-03157-PSG-JEM (C.D. Cal.)

Date Submitted: July 22, 2022

Qualifications

Dr. Kimberly K. Cameron is a Principal at Engineering Systems Incorporated (ESi), a leading scientific and engineering firm. She specializes in mechanical engineering and metallurgy and has extensive experience with stress analysis, failure analysis, fatigue analysis, and fracture mechanics. In particular, she has extensive experience performing design and damage tolerance evaluations on pipeline systems, evaluating mechanical and welded joints in pipeline systems, evaluating in line inspection tools and assessing the integrity of pipeline systems. She has consulted for pipeline owners and operators on integrity management programs.

Dr. Cameron graduated with high honors from Princeton University with a degree in Mechanical Engineering and minors in Materials Science, Applied Mathematics and Engineering Physics. She has also received a doctorate in Mechanical Engineering with a minor in Materials Science and Engineering from Stanford University. Her background in Applied Mathematics includes statistical analysis. She has received numerous awards including fellowships from the Department of Defense, the National Science Foundation, and Lucent Technologies. She is a Registered Professional Engineer in both Mechanical Engineering and Metallurgy in the State of California.

Dr. Cameron's testimony is included as an attachment, and her CV is included in the Reports submitted in *Andrews et al. v. Plains All American Pipeline, L.P., et al.*, No. 2:15-cv-04113-PSG-JEM. Those reports are also attached and are incorporated by reference. Dr. Cameron's hourly rate is \$475.

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Materials Considered

My *Andrews* reports include the list of materials considered and are incorporated here by reference. In addition to those materials and those cited below, I also considered the *Andrews* Depositions of Joshua Bremner and Michael Stackhouse

Summary of Opinions

Class Counsel retained Engineering Systems Inc. (ESi) to investigate whether Plains maintained and operated Lines 901 and 903, as those terms are understood in the industry. Line 901 is a 24-inch diameter pipeline which runs approximately 10.6 miles from storage tanks in Las Flores Canyon to the Gaviota Pump Station in Santa Barbara County. Line 903 is a 30-inch diameter pipeline which runs 128 miles from the Gaviota Pump Station to the Emidio Pump Station in Kern County, California.

I have explained in detail in my *Andrews* reports why Plains failed to maintain Lines 901 and 903 and incorporate those discussions by reference. Many of these issues are discussed in various materials prepared by the Pipeline and Hazardous Materials Safety Administration related to these lines, including its Corrective Action Orders and its Line 901 Failure investigative Report, all of which I also incorporate by reference. I also discuss the lack of maintenance below, and have concluded that Plains was not maintaining lines 901 and 903 according to industry standards or as required by federal regulations, based on their failure to follow an integrity management plan or alarm management plan.

I also conclude that Plains is not operating Lines 901 or 903, as that term is understood in the pipeline industry. On May 21, 2015, PHMSA issued a corrective order requiring Plains to shut down Line 901, purge it of crude oil and fill it with an inert gas.¹ Plains isolated and purged the lines with nitrogen by June 18, 2015.² At the time of the PHMSA corrective order, Plains' Line 901 was no longer in operation. Similarly, Plains was ordered to shut down the section of Line 903 from Gaviota to Pentland on May 30, 2015, such that it was no longer in operation.³

Integrity Management

To operate and maintain a hazardous liquid pipeline, owners and operators at a minimum must comply with Part 195 Title 9 of the Federal Regulations. These regulations require operators to develop a written integrity management program that addresses the risks on each segment of pipeline, implement and follow the program and follow recognized industry practices (unless the operator demonstrates that an alternative practice is supported by a reliable engineering evaluation and provides an equivalent level of public safety and environmental protection).

Importantly, operators are required to continually change the program to reflect the operating experience, conclusions drawn from results of the integrity assessments, other maintenance and surveillance data, and evaluations of consequences of a failure on the high consequence area.

¹ PHMSA Corrective Action Order, May 21, 2015.

² PHMSA Amendment No. 3 to the Corrective Action Order, June 16, 2016.

³ This section of Line 903 was subsequently purged in phases between December 2015 and April 2016.



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An operator must include, at minimum, each of the following elements in its written integrity management program:

- A process for identifying which pipeline segments could affect a high consequence area;
- A baseline assessment plan;
- An analysis that integrates all available information about the integrity of the entire pipeline and the consequences of a failure;
- Criteria for remedial actions to address integrity issues raised by the assessment methods and information analysis;
- A continual process of assessment and evaluation to maintain a pipeline's integrity;
- Identification of preventive and mitigative measures to protect the high consequence area;
- Methods to measure the program's effectiveness;
- A process for review of integrity assessment results and information analysis by a person qualified to evaluate the results and information.

Documents must be kept to support the decisions and analyses, including any modifications, justifications, variances, deviations and determinations made, and actions taken, to implement and evaluate each element of the integrity management program.

Plains' Integrity Management Failures

Plains was not maintaining Lines 901 or 903 according to industry standards or as required by federal regulations as discussed above. Plains' Lines 901 and 903 are buried insulated lines, and a primary risk factor to be considered to maintain the lines is corrosion under insulation (CUI). Plains was not taking any steps to consider CUI or prioritize for inspection locations particularly susceptible to CUI. For insulated lines, identifying and addressing CUI as an independent threat is an industry recognized practice⁴ and the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA) specifically criticized Plains because "Plains did not identify CUI as a risk-driving threat in their federally-mandated Integrity Management Program."⁵ Plains employee Nerbonne acknowledged that Plains knew it should independently follow up on the risk of moisture intrusion and CUI [Nerbonne Deposition at 76-79.] Plains did not do this despite data collected in 2007 indicating the risk. Similar issues occurred on Line 903.⁶ This glaring failure shows that Plains was not maintaining Lines 901 and 903 and, in fact, this failure led to release of crude oil into the ocean.⁷

Plains was also more generally not following the steps required in an integrity management program (IMP) to ensure that the program is effective. The Integrity Management Board at Plains never convened and there are virtually no written materials arising out of other regular meetings

⁴ NACE publication

⁵ PHMSA Report starting at starting at PLAINS-CL00723583.

⁶ Shelton Deposition, pages 197-201, 205-207,

⁷ See also *Andrews* Deposition Exhibits 1067, 1124, 1129, 1298, 1300. See e.g., *Shelton* Deposition at 220-224, 237-238; *Richard Hartig* Deposition at 128.



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that supposedly stood in for Board Meetings.⁸ This inadequacy of the Integrity Management Board is consistent with testimony from various Plains employees that indicate a general lack of familiarity with or reliance on the IMP.⁹

One commonly used industry tool to assist in the maintenance of pipelines is an in-line inspection tool (a tool that can be run inside and along the pipeline) utilizing either ultrasonic inspection technology or magnetic flux inspection technology. The tools can be oriented either axially (along the axis of the pipe) or circumferentially depending on the types of defects that are of interest. To be effective, however, these tools must be used within the framework IMP otherwise they will not provide a level of safety needed to maintain the pipeline. For example, the IMP ensures that the data from the tool is reliable and used properly in conjunction with other data collected on the pipeline. Overall, the use of the tools within the framework of the IMP is part of the continual process of assessment and evaluation to ensure that risk on the pipeline is properly mitigated to maintain the pipeline.

Despite the written requirements of the IMP, Plains did not ensure that the data from the inspection tool was reliable, did not complete the required analysis to identify preventative and mitigative (P&M) measures to protect high consequence areas, and did not measure the program's effectiveness to maintain the integrity of Lines 901 and Line 903. Failure to do the required P&M's was not just a problem on Lines 901 and 903, but was indicative of a widespread failure at Plains to maintain its pipelines. Below is a chart created by Plains that shows how many required P&M's were not completed.

Required P&M's (ILI or Hydro) All Divisions	
Year	Percentage Complete
2009	93%
2010	100%
2011	83.3%
2012	25.9%
2013	9.9%
2014	0%
2015	0%

Plains failed to maintain Lines 901 and 903 even despite warnings from PHMSA related to these very issues. In 2012, PHMSA audited Lines 901 and 903. The audit revealed to Plains that they did not have required documentation requested by PHMSA and Plains had to go back to underlying data collection forms (Forms 501) to create the required analysis documents.¹⁰ As an example of missing analysis documents that were critical, Plains had not created unity plots (that

⁸ Nerbonne Deposition at 18-27, 72-73, 78-79, 84-89; Cunningham Deposition at 302-313; Vinot Deposition at 127-129.

⁹ Cordova at 60, Vinot at 63, 74, 75, 81-82, 88, Gicuhi at 111, Nerbonne at 41-42, 84-86, 90-93.

¹⁰ Deposition of Robin Cunningham at 209-211.



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are used to ensure that the ILI tool is reliably finding and sizing defects),¹¹ had not interfaced with the ILI vendor about under-calling of defect sizes,¹² and had not done the analysis for P&M measures (which should have been documented on form F-11).¹³

As explained by PHMSA, "Plains did not adequately document its consideration of P&M measures or its justification for not implementing these measures. The inspection team found a lack of documentation to demonstrate the consideration and decision-making process of potential P&M measures."¹⁴ In addition, PHMSA noted that Plains could not locate the preventative and mitigative evaluations for the "Sisquoc to Pentland" and "Pentland to Emidio" segments of Line 903.¹⁵ PHMSA also warned Plains about incomplete documentation of its Management of Change (MOC) and inadequate documentation of current and proposed pressure set points.¹⁶

PHMSA further warned that "Plains had unclear procedures and documentation of its decision-making process for addressing when in line inspection (ILI) tool run data indicates anomalous conditions. Specifically, the Plains procedures did not appear to fully discuss or document how tool tolerance was addressed or how measured anomalies deviated significantly from the size predicted by the tool were addressed."¹⁷ Without performing these types of analyses, Plains is not maintaining Lines 901 and 903. An ILI tool on its own, without the framework of the IMP is not an adequate or permissible way to maintain a pipeline. Given these failures of Plains to maintain the lines, it was unsurprising that a failure of Line 901 occurred, and that Lines 901 and 903 were ordered shutdown and out of operation pending express approval of PHMSA.

My *Andrews* reports provide further detail regarding the incorrect data reflected in the 2008 P&M forms (Part A), complete absence of recommendations (Part B), evaluations of those recommendations (Part C), and Leak Detection and EFRD evaluations (Part D). It also discusses the absence of P&M forms after the 2012 ILI at the time of the audit and failure and how system wide Plains is not completing P&M assessments in a timely fashion per federal regulations. [See Sections 2, 5, 10, 11, 12 and 13 and 19 of my Expert Report].

After the PHMSA audit, Plains could have corrected the issues identified by PHMSA for the next assessment. Instead, Plains continued to not do the analysis required to maintain the lines. For example, Plains changed the way the ILI results were analyzed without any justification or documentation and did not address severe under-calls in the length and the width sizing. Lamontage, a firm that provided PHMSA with an ILI Evaluation Report for Line 901, explained that "considering only anomalies that are at least 15% of the wall thickness is not standard in the industry" – precisely the change that Plains made without analysis, justification or documentation. As explained in my Expert Report, this contributed to the under-calls in sizing which were then not investigated. Plains' Integrity Specialist could not recall who decided on this change in the

¹¹ Deposition of Robin Cunningham at 60-62.

¹² Deposition of Robin Cunningham at 60-62.

¹³ PLAINS-CL00051991, PHMSA-KA-00154

¹⁴ PLAINS-CL00514575.

¹⁵ PLAINS-CL00514574-79.

¹⁶ PHMSA-KA-00156.

¹⁷ PHMSA-KA-00156.



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analysis of the tool results (change in clustering criteria), or any discussions in Plains' integrity group about how clustering may have resulted in lower anomaly sizing.^{18 19}

Likewise, the very analysis on forms F11 that Plains was cited for in 2012 for the 2007 assessment, was again not done for the 2012 assessment until after the release of crude oil.²⁰ No evaluation was done of the effectiveness of the risk assessment, which allowed to rankings of the risk to increased the weighting given to internal corrosion versus external corrosion despite the documented external corrosion problems with almost no internal corrosion. Overall, this prevented Plains from understanding the risk in Lines 901 and 903 and properly maintaining the lines.

Likewise, Plains did not address PHMSA's warning that Plains did not have a procedure or document how tool tolerance was addressed and how to address the deviation between field measurements and ILI tool measurements. The ILI tool was severely under calling the size of anomalies identified by the ILI tool and Plains did not take any measure to address this.

In particular, reports based on ILI tool runs in 2007 for Line 901 were not completed until after a crude oil release in 2015.

Control Room Procedures and Alarm Management

Another important aspect of maintaining a hazardous liquid pipeline is control room procedures and leak detection. Supervisory control and data acquisition (SCADA) is a computer based system used by pipeline operators to remotely monitor, gather and process real-time data from the field (such as temperatures, pressures and flow rates) and directly interact with devices in the field (such as valves and pumps). In addition to the data gathering and processing, alarm management is a standard feature of all SCADA systems. Computational pipeline monitoring (CPM) refers to "algorithmic monitoring tools that are used to enhance the abilities of a pipeline controller to recognize hydraulic anomalies that may be indicative of a pipeline leak or commodity release."²¹ CPM alarms are in addition to the SCADA system alarms and are preferably integrated onto the same alarm display as the SCADA alarms.

The American Petroleum Institute (API) publishes several industry standards to address these issues. API 1130 has been incorporated into the federal pipeline safety regulations by §§ 195.3 and addresses computational pipeline monitoring (CPM) for leak detection in liquid pipelines. API 1167 sets out the recommended practices for Pipeline SCADA Alarm Management. API 1168 discusses Control Room management, and API 1165 discusses SCADA display standards.

The federal regulations are located in §§ 195.446. §§ 195.446(b) requires operators to define the roles and responsibilities of a controller during normal, abnormal, and emergency operating conditions. §§ 195.446(c) requires operators to provide their controllers with the information, tools, processes and procedures necessary for the controllers to carry out the roles and responsibilities the operators have defined. §§ 195.446(e) requires operators that use SCADA systems to have written alarm management plans to provide for effective controller response to alarms. §§

¹⁸ Deposition of Alex Vinod at 147-149, 161-163.

¹⁹ This lack of focus on the clustering rule is dangerous, something Plains should have understood based on a prior close call on Line 903 caused in part by the clustering rule. [Alex Vinot Deposition at 158-165; Ex. 1300].

²⁰ PLAINS-CL-00723729.

²¹ API 1130.



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195.446(f) requires operators to assure that changes that could affect control room operations are coordinated with the control room personnel. §§ 195.446(g) requires operators to assure that lessons learned from their operating experiences are incorporated, as appropriate, into their control room management procedures. §§ 195.446(h) requires operators to establish a controller training program and review the training program content to identify potential improvements at least once each calendar year, but at intervals not to exceed fifteen months. §§ 195.446(i) requires operators to submit their procedures, upon request, to PHMSA or, in the case of an intrastate pipeline facility regulated by a state, to the appropriate state agency. §§ 195.446 (j) requires operators to maintain records that demonstrate compliance with the requirements of the rule, and documentation to demonstrate that any deviation from the procedures required by the rule was necessary for the safe operation of a pipeline facility.

Plains' Alarm Management Failures

Plains also fell well short of industry standards and federal regulations related to alarm management plans. Overall, the alarms should set to be able to detect relatively small leaks without overwhelming operators with false alarms. To this end, and to comply with the discussed federal regulations, Plains should have a formalized process for rationalizing and checking the alarm set points and priorities. Plains, however, did not have an adequately formalized process for rationalizing and checking the alarm set points. [Deposition of Each, Exhibit 1243]. Contrary to regulations, there is also a gap of more than 15 months between the revisions of the Alarm Management Plan, [PLAINS-CL00133883] and completed forms such as given in Appendix A of the Alarm Management Procedures are missing. [PLAINS-CL00019432]. Likewise, the setpoint rationalization worksheet has also not been completed. While some alarm metrics have been collected, it is not clear that appropriate analysis has been done of those metrics. [PLAINS-CL00133883]. In addition to not appropriately conducting these analyses and reviews, several alarms were not set to an appropriate level²² and a safety related alarm was not implemented as such.²³ As discussed in my Expert Report, the California console has too many alarms annunciated over a short period of time, which reduces the ability of a controller to appropriately respond to alarms. These issues prevented Plains from maintaining Lines 901 and 903.

Plains' Lines 901 and 903 Not in Operation

As understood in industry, a hazardous liquid line is in operation when there is hazardous liquid running through it.²⁴ If there is no hazardous liquid running through the pipeline it is not

²² See my Expert Report, Section 18.

²³ PLAINS-CL0034562, Deposition of Each, Exhibit 1245, Deposition of Vaughan, 151:22-23.

²⁴ See, e.g., PHMSA May 21, 2015 CAO at 4 (ruling against the "continued operation of the pipeline"), 5 ("Plains must not operate the Affected Pipeline until authorized to do so by the Director."), 7 (Prior to resuming operation of the Affected Pipeline, Plains must develop and submit a written Restart Plan to the Director for prior approval."); PHMSA CAO Amendment No. 1 at 4 (ruling against "continued operation of Line 901 and 903) (June 3, 2015); PHMSA Nov. 12, 2015 CAO Amendment No. 2 ("...Line 903 had ceased operation on May 28, 2015."), 4 (denying operation), 6 ("...Plains must not operate Line 903 between Gaviota and Pentland stations until authorized to do so by the Director."), PHMSA Docket Number PHMSA-2018-0042 (Explaining that "Since June 2012, though not in operation, the GPLNG Terminal has maintained a warmed state, where all LNG has been removed, but equipment



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considered to be operating. Pipelines that are not in operation include ones that are deactivated, inactive, or out of service. Lines 901 and 903 were required to be shut down by PHMSA and have not been in operation since.

Not only did PHMSA require that Lines 901 and 903 be shut down²⁵, it required Plains to purge and isolate the lines with nitrogen. The presence of nitrogen in Lines 901 and 903 does not indicate that the lines are operational, as PHMSA itself recognized. Rather, nitrogen is an inert gas and the presence of nitrogen in the lines indicates that Plains has purged the lines of hazardous liquid. Plains cannot operate the lines while they are purged with nitrogen and even if Plains wanted to operate those lines in the future, specific permission from PHMSA would need to be granted to return the lines to operation.

Similarly, in California, the Office of the State Fire Marshall (OFSM) does not require the same activities to be performed on a purged line compared to a line in operation. However, to return a purged pipeline to operation, the Office of the State Fire Marshal (OFSM) must inspect and verify that the line is in compliance with State and Federal pipeline regulations.

Conclusions

Overall, as discussed above, after PHMSA shut down Line 901 and much of Line 903 until the present, Lines 901 and 903 were not in operation. Prior to that, Plains was not maintaining the lines in accordance with industry standards or federal regulations.

Respectfully Submitted,

A handwritten signature in blue ink that reads "Kimberly Cameron".

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remains in a state of readiness that includes methane vapor.”), Docket No. CP17-40-007, Motion to Reject in Part and Protest of the Environmental Defense Fund (Concluding that the Spire STL Pipeline is currently in operation based on the exchange “Commissioner asks, ‘Is the gas flowing on that pipeline today?’; Spire Missouri responds, ‘It is’.”), API Damage Prevention Toolbox, Pipeline Depth of Cover Rev. 1. (“not in operation (deactivated, inactive, out of service)”), California Department of Conservation, Geologic Energy Management Division, Facilities, Tank, and Pipeline Status Chart (Describing an “idle (inactive)” pipeline as “not in operation”), PHMSA Failure Investigation Report – Magellan Ammonia Line 501 Buckle (describing an idle line as not in operation).

²⁵ Plains voluntarily shut down Line 903 on May 19, 2015, restarted the line on May 29, and shut the line back down on May 30. Line 903 has been shut down since then.



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